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1. A method of establishing wireless communications between an interrogator and individual ones of multiple wireless identification devices, the wireless identification devices having respective identification numbers and being addressable by specifying identification numbers with any one of multiple possible degrees of precision, the method comprising utilizing a tree search in an arbitration scheme to determine a degree of precision necessary to establish one-on-one communications between the interrogator and individual ones of the multiple wireless identification, devices, a search tree being defined for the tree search method, the tree having multiple selectable levels respectively representing subgroups of the multiple wireless identification devices, the level at which a tree search starts being variable the method further comprising starting the tree search at any selectable level of the search tree.

2. A method in accordance with claim 1 and further comprising determining the maximum possible number of wireless identification devices that could communicate with the interrogator, and selecting a level of the search tree based on the determined maximum possible number of wireless identification devices that could communicate with the interrogator.

3. A method in accordance with claim 2 and further comprising starting the tree search at a level determined by taking the base two logarithm of the determined maximum possible number, wherein the level of the tree containing all subgroups is considered level zero, and lower levels are numbered consecutively.

4. A method in accordance with claim 2 and further comprising starting the tree search at a level determined by taking the base two logarithm of the determined maximum possible number, wherein the level of the tree containing all subgroups is considered level zero, and lower levels are numbered consecutively, and wherein the maximum number of devices in a subgroup in one level is half of the maximum number of devices in the next higher level.

5. A method in accordance with claim 2 and further comprising starting the tree search at a level determined by taking the base two logarithm of the power of two nearest the determined maximum possible number, wherein the level of the tree containing all subgroups is considered level zero, and lower levels are numbered consecutively, and wherein the maximum number of devices in a subgroup in one level is half of the maximum number of devices in the next higher level.

6. A method in accordance with claim 1 wherein the wireless identification device comprises an integrated circuit including a receiver, a modulator, and a microprocessor in communication with the receiver and modulator.

7. A method of addressing messages from an interrogator to a selected one or more of a number of communications devices, the method comprising:

establishing for respective devices unique identification numbers respectively having a first predetermined number of bits;

establishing a second predetermined number of bits to be used for random values;

causing the devices to select random values, wherein respective devices choose random values independently of random values selected by the other devices;

determining the maximum number of devices potentially capable of responding to the interrogator;

transmitting a command from the interrogator requesting devices having random values within a specified group of random values to respond, by using a subset of the second predetermined number of bits, the specified group being chosen in response to the determined maximum number;

receiving the command at multiple devices, devices receiving the command respectively determining if the random value chosen by the device falls within the specified group and, if so, sending a reply to the interrogator; and

determining using the interrogator if a collision occurred between devices that sent a reply and, if so, creating a new, smaller, specified group.

8. A method of addressing messages from an interrogator to a selected one or more of a number of communications devices in accordance with claim 7 wherein sending a reply to the interrogator comprises transmitting the unique identification number of the device sending the reply.

9. A method of addressing messages from an interrogator to a selected one or more of a number of communications devices in accordance with claim **7** wherein sending a reply to the interrogator comprises transmitting the random value of the device sending the reply.

10. A method of addressing messages from an interrogator to a selected one or more of a number of communications

devices in accordance with claim 7 wherein sending a reply to the interrogator comprises transmitting both the random value of the device sending the reply and the unique identification number of the device sending the reply.

11. A method of addressing messages from an interrogator to a selected one or more of a number of communications devices in accordance with claim 7 wherein, after receiving a reply without collision from a device, the interrogator sends a command individually addressed to that device.

12. A method of addressing messages from an interrogator to a selected one or more of a number of communications devices, the method comprising:

causing the devices to select random values for use as arbitration numbers, wherein respective devices choose random values independently of random values selected by the other devices, the devices being addressable by specifying arbitration numbers with any one of multiple possible degrees of precision;

transmitting a command from the interrogator requesting devices having random values within a specified group of a plurality of possible groups of random values to respond, the specified group being less than the entire set of random values, the plurality of possible groups being organized in a binary tree defined by a plurality of nodes at respective levels, wherein the size of groups of random values decrease in size by half with each node descended, wherein the specified group is below a node on the tree selected based on the maximum

number of devices capable of communicating with the interrogator;

receiving the command at multiple devices, devices receiving the command respectively determining if the random value chosen by the device falls within the specified group and, if so, sending a reply to the interrogator; and, if not, not sending a reply; and

determining using the interrogator if a collision occurred between devices that sent a reply and, if so, creating a new, smaller, specified group by descending in the tree.

13. A method of addressing messages from an interrogator to a selected one or more of a number of communications devices in accordance with claim 12 and further including establishing a predetermined number of bits to be used for the random values.

14. A method of addressing messages from an interrogator to a selected one or more of a number of communications devices in accordance with claim 13 wherein the predetermined number of bits to be used for the random values comprises an integer multiple of eight.

15. A method of addressing messages from an interrogator to a selected one or more of a number of communications devices in accordance with claim 13 wherein devices sending a reply to the interrogator do so within a randomly selected time slot of a number of slots.

16. A method of addressing messages from an interrogator to a selected one or more of a number of RFID devices, the method comprising:

establishing for respective devices a predetermined number of bits to be used for random values, the predetermined number being a multiple of sixteen;

causing the devices to select random values, wherein respective devices choose random values independently of random values selected by the other devices;

transmitting a command from the interrogator requesting devices having random values within a specified group of a plurality of possible groups of random values to respond, the specified group being equal to or less than

the entire set of random values, the plurality of possible groups being organized in a binary tree defined by a plurality of nodes at respective levels, wherein the maximum size of groups of random values decrease in size by half with each node descended, wherein the specified group is below a node on a level of the tree selected based on the maximum number of devices known to be capable of communicating with the interrogator;

receiving the command at multiple devices, devices receiving the command respectively determining if the random value chosen by the device falls within the specified group and, only if so, sending a reply to the interrogator, wherein sending a reply to the interrogator comprises transmitting both the random value of the device sending the reply and the unique identification number of the device sending the reply;

using the interrogator to determine if a collision occurred between devices that sent a reply and, if so, creating a new, smaller, specified group using a level of the tree different from the level used in the interrogator transmitting, the interrogator transmitting a command requesting devices having random values within the new specified group of random values to respond; and

if a reply without collision is received from a device, the interrogator subsequently sending a command individually addressed to that device.

17. A method of addressing messages from an interrogator to a selected one or more of a number of RFID devices in accordance with claim 16 and further comprising determining the maximum possible number of wireless identification devices that could communicate with the interrogator.

18. A method of addressing messages from an interrogator to a selected one or more of a number of RFID devices in accordance with claim 16 wherein selecting the level of the tree comprises taking the base two logarithm of the determined maximum possible number, wherein a level of the tree containing all subgroups is considered level zero, and lower levels are numbered consecutively.

19. A method of addressing messages from an interrogator to a selected one or more of a number of RFID devices in accordance with claim 16 wherein selecting the level of the tree comprises taking the base two logarithm of the determined maximum possible number, wherein a level of the tree containing all subgroups is considered level zero, and lower levels are numbered consecutively, and wherein the maximum number of devices in a subgroup in one level is half of the maximum number of devices in the next higher level.

20. A method of addressing messages from an interrogator to a selected one or more of a number of RFID devices in accordance with claim 16 wherein selecting the level of the tree comprises taking the base two logarithm of the power of two nearest the determined maximum possible number, wherein the level of the tree containing all subgroups is considered level zero, and lower levels are numbered consecutively, and wherein the maximum number of devices in a subgroup in one level is half of the maximum number of devices in the next higher level.

21. A method of addressing messages from an interrogator to a selected one or more of a number of RFID devices in accordance with claim 16 wherein the wireless identification device comprises an integrated circuit including a receiver, a modulator, and a microprocessor in communication with the receiver and modulator.

22. A method of addressing messages from an interrogator to a selected one or more of a number of RFID devices in

accordance with claim 16 and further comprising, after the interrogator transmits a command requesting devices having random values within the new specified group of random values to respond, determining, using devices receiving the command, if their chosen random values fall within the new smaller specified group and, if so, sending a reply to the interrogator.

23. A method of addressing messages from an interrogator to a selected one or more of a number of RFID devices in accordance with claim 22 and further comprising, after the interrogator transmits a command requesting devices having random values within the new specified group of random values to respond, determining if a collision occurred between devices that sent a reply and, if so, creating a new specified group and repeating the transmitting of the command requesting devices having random values within a specified group of random values to respond using different specified groups until all of the devices within communications range are identified.

24. A communications system comprising an interrogator, and a plurality of wireless identification devices configured to communicate with the interrogator in a wireless fashion, the wireless identification devices having respective identification numbers, the interrogator being configured to employ a tree search in a search tree having multiple selectable levels, to determine the identification numbers of the different wireless identification devices with sufficient precision so as to be able to establish one-on-one communications between the interrogator and individual ones of the multiple wireless identification devices, wherein the interrogator is configured to start the tree search at any selectable level of the search tree.

25. A communications system in accordance with claim 24 wherein the tree search is a binary tree search.

26. A communications system in accordance with claim 24 wherein the wireless identification device comprises an integrated circuit including a receiver, a modulator, and a microprocessor in communication with the receiver and modulator.

27. A system comprising:

an interrogator;

a number of communications devices capable of wireless communications with the interrogator;

means for establishing a predetermined number of bits to be used as random numbers, and for causing respective devices to select random numbers respectively having the predetermined number of bits;

means for inputting a predetermined number indicative of the maximum number of devices possibly capable of communicating with the receiver;

means for causing the interrogator to transmit a command requesting devices having random values within a specified group of random values to respond, the specified group being chosen in response to the inputted predetermined number;

means for causing devices receiving the command to determine if their chosen random values fall within the specified group and, if so, send a reply to the interrogator; and

means for causing the interrogator to determine if a collision occurred between devices that sent a reply and, if so, create a new, smaller, specified group.

28. A system in accordance with claim 27 wherein sending a reply to the interrogator comprises transmitting the random value of the device sending the reply.

29. A system in accordance with claim 27 wherein the interrogator further includes means for, after receiving a

reply without collision from a device, sending a command individually addressed to that device.

30. A system comprising:

an interrogator configured to communicate to a selected one or more of a number of communications devices;

a plurality of communications devices;

the devices being configured to select random values, wherein respective devices choose random values independently of random values selected by the other devices, different sized groups of devices being addressable by specifying random values with differing levels of precision;

the interrogator being configured to transmit a command requesting devices having random values within a specified group of a plurality of possible groups of random values to respond, the specified group being less than the entire set of random values, the plurality of possible groups being organized in a binary tree defined by a plurality of nodes at respective levels, wherein the size of groups of random values decrease in size by half with each node descended, wherein the specified group is below a node on the tree selected based on a predetermined maximum number of devices capable of communicating with the interrogator;

devices receiving the command being configured to respectively determine if their chosen random values fall within the specified group and, if so, send a reply to the interrogator; and, if not, not send a reply; and

the interrogator being configured to determine if a collision occurred between devices that sent a reply and, if so, create a new, smaller, specified group by descending in the tree.

31. A system in accordance with claim 30 wherein the random values respectively have a predetermined number of bits.

32. A system in accordance with claim 30 wherein respective devices are configured to store unique identification numbers of a predetermined number of bits.

33. A system in accordance with claim 30 wherein respective devices are configured to store unique identification numbers of sixteen bits.

34. A system comprising:

an interrogator configured to communicate to a selected one or more of a number of RFID devices;

a plurality of RFID devices, respective devices being configured to store unique identification numbers respectively having a first predetermined number of bits, respective devices being further configured to store a second predetermined number of bits to be used for random values, respective devices being configured

to select random values independently of random values selected by the other devices;

the interrogator being configured to transmit an identify command requesting a response from devices having random values within a specified group of a plurality of possible groups or random values, the specified group being less than or equal to the entire set of random values, the plurality of possible groups being organized in a binary tree defined by a plurality of nodes at respective levels, wherein the maximum size of groups of random values decrease in size by half with each node descended, wherein the specified group is below a node on a level of the tree selected based on the maximum number of devices known to be capable of communicating with the interrogator;

devices receiving the command respectively being configured to determine if their chosen random values fall within the specified group and, only if so, send a reply to the interrogator, wherein sending a reply to the interrogator comprises transmitting both the random value of the device sending the reply and the unique identification number of the device sending the reply;

the interrogator being configured to determine if a colli-

value of the device sending the reply and the unique identification number of the device sending the reply;

the interrogator being configured to determine if a collision occurred between devices that sent a reply and, if so, create a new, smaller, specified group using a level of the tree different from the level used in previously transmitting an identify command, the interrogator transmitting an identify command requesting devices having random values within the new specified group of random values to respond; and

the interrogator being configured to send a command individually addressed to a device after communicating with a device without a collision.

35. A system in accordance with claim 34 wherein the interrogator is configured to input and store the predetermined number.

36. A system in accordance with claim 34 wherein the devices are configured to respectively determine if their chosen random values fall within a specified group and, if so, send a reply, upon receiving respective identify commands.

37. A system in accordance with claim 36 wherein the interrogator is configured to determine if a collision occurred between devices that sent a reply in response to

respective identify commands and, if so, create further new specified groups and repeat the transmitting of the identify command requesting devices having random values within a specified group of random values to respond using different specified groups until all responding devices are identified.

respective identify commands and, if so, create further new specified groups and repeat the transmitting of the identify command requesting devices having random values within a specified group of random values to respond using different specified groups until all responding devices are identified.

38. A system comprising:

an interrogator configured to communicate to a selected one or more of a number of RFID devices;

a plurality of RFID devices, respective devices being configured to store unique identification numbers respectively having a first predetermined number of bits, respective devices being further configured to store a second predetermined number of bits to be used for random values, respective devices being configured to select random values independently of random values selected by the other devices;

the interrogator being configured to transmit an identify command requesting a response from devices having random values within a specified group of a plurality of possible groups or random values, the specified group being less than or equal to the entire set of random values, the plurality of possible groups being organized in a binary tree defined by a plurality of nodes at respective levels, wherein the maximum size of groups of random values decrease in size by half with each node descended, wherein the specified group is below a node on a level of the tree selected based on the maximum number of devices known to be capable of communicating with the interrogator;

devices receiving the command respectively being configured to determine if their chosen random values fall within the specified group and, only if so, send a reply to the interrogator, wherein sending a reply to the interrogator comprises transmitting the unique identification number of the device sending the reply;

the interrogator being configured to determine if a collision occurred between devices that sent a reply and, if so, create a new, smaller, specified group using a level of

the tree different from the level used in previously transmitting an identify command, the interrogator transmitting an identify command requesting devices having random values within the new specified group of random values to respond; and

the interrogator being configured to send a command individually addressed to a device after communicating with a device without a collision.

39. A method comprising:

using a tree search to determine an identification number of one of a plurality of wireless identification devices, a search tree being defined for the tree search; and

starting the tree search at a selectable level of the search tree.

40. The method of claim 39, wherein the selectable level is selected to be Level 1 or a level further down the search tree.

41. The method of claim 39, wherein the selectable level is selected to be Level 2 or a level further down the search tree.

42. The method of claim 39, further comprising skipping a level of the search tree during the tree search scheme.

43. The method of claim 42, wherein skipping the level is done in response to receiving a first reply from the one of the plurality of wireless identification devices and detecting a collision in the first reply.

44. The method of claim 43, wherein skipping the level is done after completing a traversal of a previous level in which the collision is detected.

45. The method of claim 43, wherein the first reply includes the identification number.

46. The method of claim 40, wherein the first reply includes an arbitration number of the one of the plurality of wireless identification devices.

47. The method of claim 39, further comprising using an Aloha scheme in combination with the tree search scheme to determine the identification number.

48. The method of claim 47, further comprising sending a plurality of signals from an interrogator, each of the plurality of signals indicating to the plurality of wireless identification devices a beginning of each of a plurality of slots associated with the Aloha scheme.

49. An interrogator comprising instructions that, when executed, cause the interrogator to perform a method comprising:

transmitting a first request for identification, in accordance with a tree search, to a first subgroup of RFID devices associated with a first branch at a first level of a search tree; and

starting the tree search at a level other than levels 0 and 1 of the search tree.

50. The interrogator of claim 49, wherein the method further comprises:

skipping a level of the search tree associated with the first branch; and

transmitting a second request for identification, in accordance with the tree search scheme, to a second subgroup of RFID devices associated with the first branch at a second level of the search tree.

51. The interrogator of claim 50, wherein skipping the level is done in response to receiving a reply from the first subgroup of RFID devices and detecting a collision in the reply.

52. The interrogator of claim 51, wherein the method further comprises transmitting a third request for identification, in accordance with the tree search scheme, to a third subgroup of RFID devices associated with a second branch at a third level of the search tree, the third level of the search tree being the level that was skipped associated with the first branch.

53. The interrogator of claim 50, wherein the reply includes an identification number or arbitration number.

54. The interrogator of claim 49, wherein the method further comprises transmitting a command that causes the first subgroup of RFID devices to independently generate arbitration numbers associated with the search tree.

55. The interrogator of claim 49, wherein the method further comprises transmitting an Aloha signal to the plurality of RFID devices, the Aloha signal associated with an Aloha scheme.

56. The interrogator of claim 50, wherein the method further comprises transmitting an Aloha signal to the plurality of RFID devices, the Aloha signal associated with an Aloha scheme.

57. The interrogator of claim 55, wherein the Aloha signal includes a marker to indicate a beginning of each of a plurality of slots associated with the Aloha scheme.

58. A method comprising:

affixing a RFID device to an object for tracking and to identify the object, the RFID device to store an identification number;

sending a first signal from an interrogator to the object, the first signal indicating a first subgroup at a first level of a search tree in accordance with a tree search;

starting the tree search at a selectable level of the search tree;

determining the identification number stored in the RFID device; and

associating the identification number with the object.

59. The method of claim 58, wherein the selectable level is selected to be Level 2 or a level further down the search tree.

60. The method of claim 58, further comprising selecting the selectable level manually.

61. The method of claim 58, further comprising sending a second signal from the interrogator, the second signal indicating a second level of the search tree, wherein a level of the search tree is skipped between the first and second levels within the subgroup;

62. The method of claim 61, further comprising receiving a reply from the RFID device in response to the first signal, wherein sending the second signal is done in response to the reply.

63. The method of claim 58, wherein tracking includes determining the location, movement, or existence of the object.

64. The method of claim 58, further comprising sending a command that causes the RFID device to generate an arbitration number associated with the search tree.

65. The method of claim 58, further comprising sending a third signal from the interrogator, the third signal being associated with an Aloha scheme.

66. The method of claim 65, wherein the Aloha signal indicates a beginning and an end of a slot period of the Aloha scheme.

67. An interrogator comprising:

a transmitter circuit to send a first signal to indicate a first value and a first location associated with a first level of a search tree to a plurality of RFID devices; and

a receiver circuit to receive a reply signal indicating if a portion of an identification number associated with the first location is equal to the first value; and

a selection circuit to determine a level of the search tree at which to start the tree search.

68. The interrogator of claim 67, wherein the selection circuit is responsive to manual input.

69. The interrogator of claim 67, further comprising a collision detection circuit to determine if there is a collision in the reply signal, the transmitter to send a second signal to indicate a second value and a second location associated with a second level of the search tree in response to the collision detection circuit detecting a collision, a level of the search tree being skipped between the first and second levels.

70. The interrogator of claim 67, further comprising a memory to store a value received from one of the plurality of RFID devices.

71. The interrogator of claim 70, wherein the memory is to store an arbitration number, and the interrogator is to address the one of the plurality of RFID device using the arbitration number.

72. The interrogator of claim 70, wherein the memory is to store an identification number, and the interrogator is to address the one of the plurality of RFID device using the identification number.

73. The interrogator of claim 67, wherein the transmitter circuit, in response to the collision detection circuit detecting a collision, is to further send a third signal, the third signal being associated with an Aloha scheme.

74. The interrogator of claim 73, wherein the third signal indicates a beginning and an end of a slot of the Aloha scheme.

75. A system comprising:

an interrogator to use a search tree in a tree search scheme to determine an identification number of each of a plurality of wireless identification devices, the interrogator to skip a level of the search tree;

an object; and

a wireless identification device, responsive to the interrogator, affixed to the object to identify the object.